

Activity 1: Merlock Holmes and the Mystery of the Stolen Pen

Merlock Holmes, possibly one of the greatest detectives of the time, faced two problems. Firstly, how is Sherlock Holmes more famous than him? (probably because he has a fancy TV show). Secondly, who stole Bernard's pen? To solve this mystery, Bernard hired Merlock. There are three suspects:



Suspect	Tom	Herbert	Monica
Motive	Bernard always beats him in every exam by 1 mark, so Tom could be jealous	Still angry with Bernard kicking a ball into his face.	Monica likes Bernard and is trying to get his attention

Bernard: "I'm stumped Merlock, how do we find out who did it? No one's talking! And no one has witnessed the crime. Should we give them broccoli to make them talk?"

Merlock: "Possibly ... but I've got a better idea ... DNA FINGERPRINTING!"

Bernard: "But how does it work?"

Merlock: "Well, each person has 23 pairs of chromosomes which are basically clumps of DNA wrapped around each other to make them more compact (like those annoying tangled earphones). And as you know, DNA is coded by the bases A, G, C and T.

There are regions or genes in each human DNA which are unique to each individual. Assuming that the thief has touched the pen, we can collect any residual skin cells on it, and amplify the unique regions in the DNA using a method called "polymerase chain reaction" (PCR). This lets us compare the DNA on the pen to the DNA from each suspect."

Bernard: "How can you guarantee that the DNA sequence is unique?"

Merlock: "This DNA region has different numbers of repeats of a certain sequence. Different individuals have DNA with different numbers of repeats. If the DNA pattern from a suspect is the same as the one found on the pen, then that suspect is the one who committed the crime."

Bernard: "How can we see these differences in the DNA?"

Merlock: . "We will run the different amplified DNA regions on an agarose gel containing a blue dye – this lets us see the DNA, and separate the DNA pieces of different sizes.

Bernard: "Sounds good Sher ... I mean Merlock! Lets get to work!"

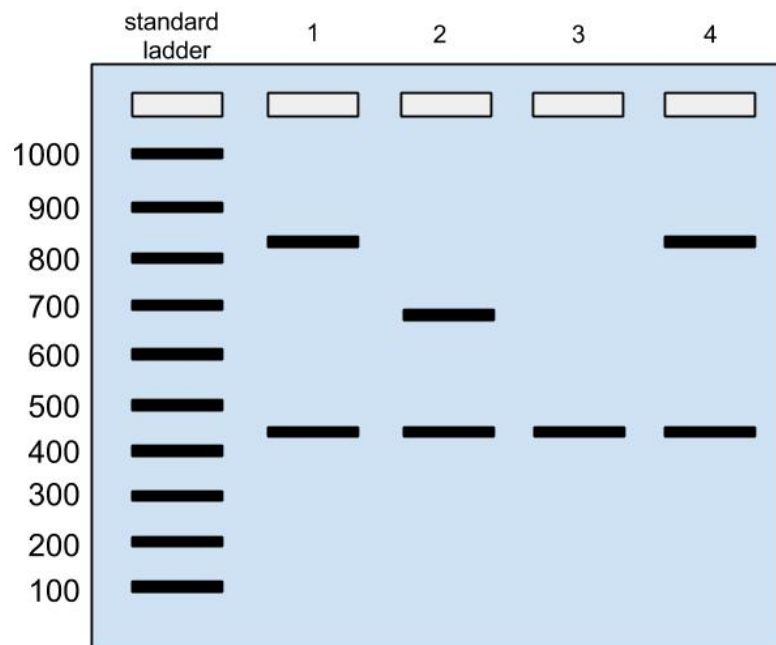
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Merlock: "Alright, collect some DNA samples from each suspect by swabbing their mouth, and then swab the pen to collect any DNA found there. And never call me Sherlock again!"

"Alright, now I will run a PCR to amplify the repeat region in each suspect and the ones found on the pen. Then, I will run a gel to separate the amplified DNAs and determine their length."

Bernard: "Here you go ... I prepared it earlier while you were explaining."

Merlock: "Wow you are a fast learner!"



Gel showing the DNA patterns obtained from (1) the pen (2) Tom (3) Herbert (4) Monica. The "standard ladder" helps determine the exact size of each DNA fragment on the gel

Bernard: "So who are we arresting?"



Suspect is _____